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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,886	08/06/2003	Tsutomu Asakawa	Q76840	7540

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EXAMINER

VERSTEEG, STEVEN H

ART UNIT PAPER NUMBER

1753

DATE MAILED: 04/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/634,886

Applicant(s)

ASAKAWA ET AL.

Examiner

Steven H. VerSteeg

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/6/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 6. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2, 3, 8, and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 2 is indefinite. Applicant claims the antireflection film to be formed by sputtering or reactive sputtering, but then states that the target (10) is made of silicon and tin, the target (11) is made of titanium, niobium, tantalum, or hafnium, and the target (12) is made of silicon. It is

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unclear how the oxide-containing layer can be formed by sputtering (i.e. not reactive sputtering) in an inactive gas atmosphere when the target doesn't contain oxygen.

5. Claim 3 depends from claim 2 and contains all of the limitations of claim 2. Therefore, claim 3 is rejected for the same reasons as claim 2.

6. Claim 8 is out of scope with claim 1. Claim 1 requires the medium, high, and low refractive index layers to be formed successively, yet claim 8 requires a conductive film to be formed before the low refractive index film.

7. Claim 10 is indefinite because of the word "type".

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2003-94548 (JP '548) in view of US 2003/0228431 A1 to Krisko et al. (Krisko).

10. For claim 1, Applicant requires a method of producing an antireflection-coated substrate comprising a transparent substrate (1) and an antireflection film formed on the transparent substrate, the antireflection film comprising a multilayer film having a medium refractive index layer (2), a high refractive index layer (3), and a low refractive index layer (4) successively formed on the transparent substrate in this order, the medium refractive index layer being made of a material comprising silicon, tin, and oxygen, the high refractive index layer being made of a material comprising oxygen and at least one element selected from a group consisting of

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titanium, niobium, tantalum, and hafnium, the low refractive index layer being made of a material comprising silicon and oxygen, the antireflection film being formed by successively depositing these layers by an in-line sputtering apparatus.

11. JP '548 discloses a method of producing an antireflection coated substrate by providing a transparent substrate 1 and forming a medium refractive index film containing silicon, tin, and oxygen, forming a high refractive index film of niobium oxide, and then forming a low refractive index film of silicon dioxide [0021]. All of the films are formed by sputtering [0021].

12. JP '548 does not disclose the layers to be formed in an in-line sputtering apparatus.

13. Krisko discloses that antireflective coatings can be formed in an in-line sputtering apparatus conventionally [0017].

14. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of JP '548 to utilize an in-line sputtering apparatus to deposit the antireflection coating because of the desire to utilize a conventional sputtering apparatus.

15. For claim 9, Applicant requires the antireflection coated substrate to be a dust proof substrate for a liquid crystal panel. For claim 10, Applicant requires the panel to be a panel for a projector of a projection type. For claim 11, Applicant requires the substrate to cover glass for a solid-state image pickup device. JP '548 discloses the substrate to be used for an LCD panel that prevents echo or a CRT [0002].

16. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2003-94548 (JP '548) in view of US 2003/0228431 A1 to Krisko et al. (Krisko) as applied to claim 1 above, and further in view of *Thin Film Processes* by Vossen et al. (Vossen).

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17. For claim 2, Applicant requires the antireflection film is formed by sputtering or reactive sputtering in an inactive gas atmosphere or in a mixed gas atmosphere comprising an inactive gas and an oxygen gas, the medium refractive index layer being deposited by the use of target (10) made of a material comprising silicon and tin, the high refractive index layer being deposited by the use of a target (11) made of a material comprising one element selected from a group consisting of titanium, niobium, tantalum, and hafnium, the low refractive index layer being deposited by the use of a target (12) made of a material comprising silicon.

18. As noted above, JP '548 uses sputtering to deposit the layers, but JP '548 does not disclose the sputtering to be by using a target without the oxygen (i.e. reactive sputtering).

19. Vossen described reactive sputtering. In reactive sputtering, a sputtering target is used that contains the material that is deposited (i.e. an oxygen containing film) and is sputtered in a reactive atmosphere containing the reactive gas (i.e. oxygen) or the sputtering target contains only the metal and is sputtered in the reactive gas (i.e. oxygen) (pg. 48-49).

20. Because JP '548 is sputter depositing oxide films for the antireflection layer, it is inherent that some form of reactive sputtering is utilized. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of JP '548 in view of Krisko to reactive sputter from targets not containing oxygen because it is one of only 2 possible reactive sputtering methods that are conventionally known in the art.

21. For claim 3, Applicant requires each of the refractive layer films to be deposited using a plurality of targets. Krisko is described above and uses a plurality of targets to deposit each layer (Figure 4).

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22. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2003-94548 (JP '548) in view of US 2003/0228431 A1 to Krisko et al. (Krisko) as applied to claim 1 above, and further in view of JP 2003-043208 (JP '208).

23. For claim 4, Applicant requires the medium refractive index film to have a refractive index of between 1.6 and 1.8 and a geometrical thickness between 60 nm and 90 nm, the high refractive index layer having a refractive index between 2.1 and 2.8 and a geometrical thickness between 90 nm and 130 nm, the low refractive index layer having a refractive index between 1.4 and 1.46 and a geometrical thickness between 80 nm and 100 nm. For claim 5, Applicant requires the medium refractive index film to comprise $\text{Si}_x\text{Sn}_y\text{O}_z$, the high refractive index film to comprise a material selected from the group consisting of TiO_2 , Nb_2O_5 , Ta_2O_5 , and HfO_2 , and the low refractive index film to comprise a layer comprising SiO_2 .

24. JP '548 in view of Krisko is described above. JP '548 discloses the medium refractive index film to have a thickness of 66 nm and a refractive index of 1.75-1.78 and be made of silicon tin oxide, the high refractive index film is Nb_2O_5 , and the low refractive index film comprises SiO_2 [0021].

25. JP '548 in view of Krisko does not disclose the refractive index of the high and low refractive index layers.

26. JP '208 discloses antireflective layers formed on a substrate where the high refractive index layer is Nb_2O_5 and has a refractive index of 1.8-2.4 [0020] and a low refractive index layer of silicon oxide with a refractive index of 1.38-1.7 [0021]. The substrate used is a transparent glass substrate (claim 4).

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27. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of JP '548 in view of Krisko to utilize the refractive index for the high refractive index layer and the low refractive index layer as taught by JP '208 because of the knowledge that those layers of those particular materials yield the particular refractive indices taught by JP '208.

28. For claim 6, Applicant requires the transparent substrate to be a glass substrate with a refractive index between 1.46 and 1.53. For claim 7, Applicant requires the surface roughness to be 0.5 nm or less.

29. JP '548 uses a TAC substrate with a refractive index of 1.5 [0020]. JP '548 does not disclose the substrate to be glass. JP '208 discloses that glass substrates (claim 4) are equally applicable in the field of forming LCD panels [0015].

30. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of JP '548 in view of Krisko to utilize a glass substrate because it is well known that glass substrate are equally equivalent in the art of LCD panel making.

31. Regarding the surface roughness, it is an obvious limitation. One of ordinary skill in the art would inherently desire to have the surface roughness as small as possible so that distortions are not present on the LCD panel.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

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For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

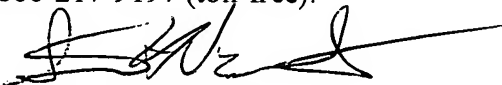
For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
April 8, 2005